Automatic Video-based Motion Analysis, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

Operations in confined, isolated, and resource-constrained environments can lead to suboptimal human performance. Understanding task performance and crew behavioral health is crucial to mission success and the optimal design, development and operation of next generation space craft. Onboard resources, such as a single conventional video camera, can capture crew motion and interaction. There is a critical need for a software tool which achieves unobtrusive, non-invasive, automatic analysis of crew activity from video footage. Many video-based human motion analysis tools assume a stationary camera and employ segmentation techniques like temporal differencing or background segmentation to detect people. However, these approaches are vulnerable to camera motion and subtle changes in the background. In addition, many existing commercial solutions use simple blob-based video analysis where the entire body is tracked as a single object. Employing such a coarse human body model is appropriate for surveillance applications concerned with motion detection and person counting; however, it is insufficient for understanding precise human actions or gestures. Therefore, a system which is able to detect human body pose automatically, regardless of camera setup, is necessary for addressing these issues. Vecna proposes a video analysis software tool that automatically processes and analyzes complex human motions in conventional 2D video without the use of specialized markers. Unlike many video analytics solutions, Vecna's solution goes beyond simple blob-based video analysis by tracking the geometric configuration of human body parts like the trunk, head, and limbs. This enables our human motion understanding algorithms to model and recognize complex human actions and interactions. The resulting system will represent a substantial breakthrough providing benefits to an array of applications in video surveillance, human-computer interaction, human factors engineering, and robotics.

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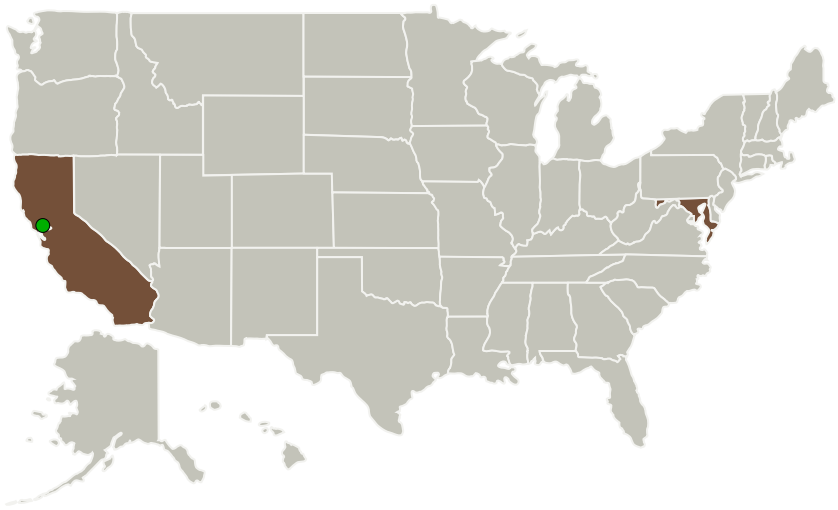
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Vecna Technologies, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Greenbelt, Maryland
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Maryland

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140305)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Vecna Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

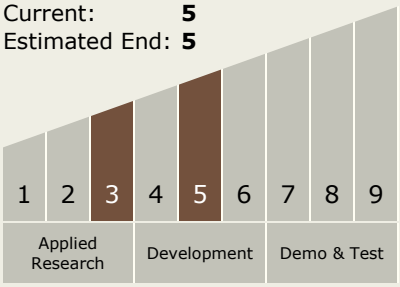
Carlos Torrez

Principal Investigator:

Neal Checka

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.6 Human Systems Integration
    - TX06.6.1 Human Factors Engineering

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System